Geophysics and Seismotectonics for Seismic Risk and Hazard Assessment

for MS and PhD students

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	Unit	Module	Aims, objectives and learning	Type of Lecture
Introduction		----	-To Introduce ourselves	----
	I	**Module 0:** Introduction to the course	-To provide aims and goals of the course in order to keep the students on track.	Academic teaching
	I	**Module 1:** Seismotectonics definition **Module 2:** Seismogenic geological structures: active faults	-To introduce the students to the seismotectonics definition and to active fault basic concepts	Academic teaching
	I	**Module 3:** Earthquake, a natural phenomenon **Module 4:** Stress field and tectonic structure	**-**To introduce the earthquake as natural physic phenomenon with high social impact. **-**To introduce the tectonic structures and their correlation with stress-field.	Academic teaching
	I	**Module 5:** Stereographic projection: how to represent a fault plane on a stereonet	-To practise with fault parameters (strike, dip, rake) representation	Active learning
Instrumental and historical seismicity	**II**	**Module 6**: Historical seismicity **Module 7**: Instrumental seismicity	-To provide basic knowledge on importance and characterization of historical events. Macroseismic scales, macroseismic fields, "location" of historical events **-**To provide basic knowledge on instrumental seismicity as: seismic location magnitude, energy release, seismic networks.	Academic teaching
		Daily test	-To fix key points of the lecture	Active learning

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Seismicity analysis	**III**	**Module 8:** seismic signals: noise, earthquakes, blast	**-**To provide basic knowledge on the seismic waveforms characteristic	Academic teaching
		Module 9: Seismicity characterization **Module 10:** Integrating Historical and instrumental seismicity	-To characterize the seismicity of an area and to provide basic knowledge on seismicity clusters: seismic sequence, swarms and background seismicity -To introduce the Gutenberg Richter low for the seismicity characterization	Academic teaching
	III	**Module 11:** Picking waveform	-To practise with waveforms of local earthquakes, regional and teleseismic recordings	Academic teaching/Active learning
		Module 12: locating earthquakes	-To became familiar with seismic location of an event	Academic teaching/Active learning
GIS environmental and GMT mapping tools	**III**	**Module 13:** Mapping earthquake data	-To represent the seismicity patterns in map and section view	Academic teaching/ Active learning
	III	**Module 14:** GIS basic element	-To represent the seismicity patterns in map and section view	Academic teaching/Active learning
		Daily test	-To fix key points of the lecture	Active learning

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Focal mechanism solutions	**IV**	**Module 15:** geological faults and focal mechanism solutions **Module 16:** Qualitative formulation	-To give a definition of Focal mechanism solutions or beach ball. -To give an intuitive formulation on Focal mechanism solutions	Academic teaching
	IV	**Module 17:** Mathematical formulation **Module 18** Polarity solution and TDMT solution	- To show the formulation of Focal mechanism solutions - To describe and explain the type of solutions to compute a Focal mechanism	Academic teaching
	IV	**Exercises**	-To have practise with focal mechanism solution	Active learning
		Daily test	- To fix the key points of the lecture	Active learning
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	IV	**Module 19**: kinematic analysis	-To practice with the focal mechanism solutions of earthquakes	Academic teaching/ Active learning
Seismotectonics	**V**	**Module 20:** Seismotectonic zonation: Italian ZS9 case study **Module 21:** Seismotectonic province: The Sicilian Basal Thrust	-To perform Seismotectonics analysis at different scales: main data and differences	Academic teaching
	V	**Module 22** Individual source: The Pollino seismic activities. **Module 23** 3D Model building, ranking, American and Italian cases		Academic teaching
	V	**Module 24:** the ongoing Italian seismic sequence Accumoli 2016	To discuss the ongoing Italian seismic sequence and its seismotectonic context	Academic teaching
		Daily test	- To fix the key points of the lecture	Active learning

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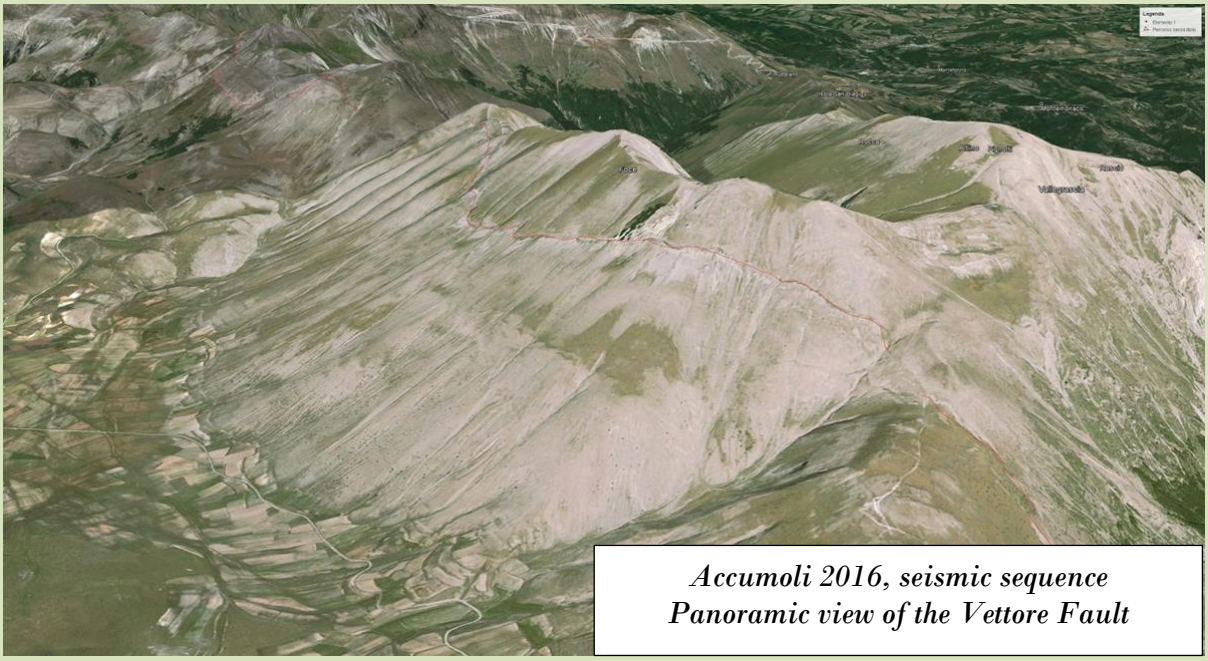
Seismotectonics and social	VI	**Module 25**: Seismic Risk definition: main concepts and ingredients	-To show how to use Seismotectonics information in Seismic hazard and risk analysis	Academic teaching
		Module 26: ground motion parameters: PGA, PGV, PGD Housner Intensity, Arias Intensity	To introduce ground motion parameter to quantify damages	Academic teaching
Seismotectonics and social impact	VII	**Module 27:** the Emilia 2012 (northern Italy) case study: seismotectonic context	-To face the whole methodological path addressed during the short course with a case study, with real data.	Academic teaching/Active learning
		Module 28: retracing the Emilia 2012 (northern Italy) case study: sources	-To face the whole methodological path afforded during the short course with a case study, with real data.	Academic teaching/Active learning
		Module 29 retracing the Emilia 2012 (northern Italy) case study: ground motion parameters	-To face the whole methodological path afforded during the short course with a case study, with real data.	Academic teaching/Active learning
		Daily test	-- To fix the key points of the lecture	Active learning

Lectio Magistralis

A journey through Italian earthquakes: from seismotectonic implication to socio-economic impact



Accumoli 2016, seismic sequence
Panoramic view of the Vettore Fault